



Third Five-Year Review Report

Third Five-Year Review Report for Metamora Landfill Superfund Site Town of Metamora Lapeer County, Michigan


September 2004

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Region 5
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Approved by:

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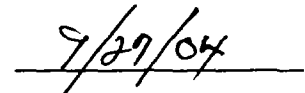


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List of Acronyms

ARAR	Applicable or Relevant and Appropriate Requirement
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
EPA	United States Environmental Protection Agency
CFR	Code of Federal Regulations
ESD	Explanation of Significant Difference
MCL	Maximum Contaminant Level
MCLG	Maximum Contaminant Level Goal
MDEQ	Michigan Department of Environmental Quality
MDNR	Michigan Department of Natural Resources
NCP	National Contingency Plan
NPL	National Priorities List
O&M	Operation and Maintenance
PCB	Polychlorinated Biphenyl
PPB	Parts per Billion
PRP	Potentially Responsible Party
RA	Remedial Action
RAO	Remedial Action Objective
RD	Remedial Design
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
VOC	Volatile Organic Compound

Executive Summary

The remedy for the Metamora Landfill Superfund Site (the Site) consists of construction of a 22.6 acre landfill cap system, meeting or exceeding the requirements of the Michigan Administrative Rule R299.9619 (as regulated by Act 451, Part 111) and Resource Conservation and Recovery Act (RCRA) Subtitle C, and monitored natural attenuation for the groundwater. The Site achieved construction completion with the signing of the Preliminary Close Out Report (PCOR) on September 27, 2001. This five-year review is the third five-year review conducted for the site. The second five-year review for this site was completed on September 14, 1999. The trigger for this five-year review was the completion date for the second five-year review.

The assessment of this five-year review found that the remedy was constructed in accordance with the requirements of the two Records of Decision (ROD) and two ROD Amendments. Operable Unit (OU)1 addresses source control and is addressed under the 1986 Record of Decision (ROD). OU2 addresses the capping of the landfill and treatment of the contaminated groundwater. The remedy for OU2 is embodied in the ROD dated September 28, 1990. However, on August 28, 1996 an amendment was applied to the 1986 OU1 ROD. Specifically the ROD amendment presented an alternative for soil remediation in Drum Area 1. The second ROD amendment, dated September 27, 2001, amended the 1990 OU2 ROD from groundwater pump and treat to monitored natural attenuation.

The remedy is protective of human health and the environment in the short term. There are no current exposure pathways and the remedy appears to be functioning as designed. The construction of landfill cap system has achieved the remedial objectives to minimize the migration of contaminants to groundwater and prevent direct contact with, or ingestion of, contaminants under the landfill cap. Issues regarding delineation of the groundwater plume and methane exceedances are being evaluated. Long-Term protectiveness for groundwater media and vadose zone methane, will be assessed in the next Five Year- Review.

Five-Year Review Summary Form

SITE IDENTIFICATION		
Site name (from WasteLAN): Metamora Landfill Superfund Site		
EPA ID (from WasteLAN): MID980506562		
Region: 5	State: MI	City/County: Metamora/Lapeer
SITE STATUS		
NPL status: <input checked="" type="checkbox"/> Final <input type="checkbox"/> Deleted <input type="checkbox"/> Other (specify)		
Remediation status (choose all that apply): <input type="checkbox"/> Under Construction <input checked="" type="checkbox"/> Operating <input checked="" type="checkbox"/> Complete		
Multiple Ous?* <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	Construction completion date: <u>9 / 27 / 2001</u>	
Has site been put into reuse? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO		
REVIEW STATUS		
Lead agency: <input checked="" type="checkbox"/> EPA <input type="checkbox"/> State <input type="checkbox"/> Tribe <input type="checkbox"/> Other Federal Agency _____		
Author name: Thomas G. Williams		
Author title: Remedial Project Manager	Author affiliation: U.S. EPA, Region 5	
Review period:** <u>5 / 11 / 2004</u> to <u>9 / 10 / 2004</u>		
Date(s) of site inspection: <u>3 / 12 / 2002</u> & <u>7 / 14 / 2004</u>		
Type of review: <div style="text-align: right; margin-top: 10px;"> <input checked="" type="checkbox"/> Post-SARA <input type="checkbox"/> Pre-SARA <input type="checkbox"/> NPL-Removal only <input type="checkbox"/> Non-NPL Remedial Action Site <input type="checkbox"/> NPL State/Tribe-lead <input type="checkbox"/> Regional Discretion) </div>		
Review number: <input type="checkbox"/> 1 (first) <input type="checkbox"/> 2 (second) <input checked="" type="checkbox"/> 3 (third) <input type="checkbox"/> Other (specify)		
Triggering action: <div style="display: flex; justify-content: space-between; margin-top: 5px;"> <input type="checkbox"/> Actual RA On-site Construction at OU # _____ <input type="checkbox"/> Actual RA Start at OU# <u>NA</u> </div> <div style="display: flex; justify-content: space-between; margin-top: 5px;"> <input type="checkbox"/> Construction Completion <input checked="" type="checkbox"/> Previous Five-Year Review Report </div> <div style="margin-top: 5px;"><input type="checkbox"/> Other (specify)</div>		
Triggering action date (from WasteLAN): <u>9 / 14 / 1999</u>		
Due date (five years after triggering action date): <u>9 / 14 / 2004</u>		

* ["OU" refers to operable unit.]

** [Review period should correspond to the actual start and end dates of the Five-Year Review in WasteLAN.]

Five-Year Review Summary Form, cont'd.

Issues:

- 1) Installation of Long Term Monitoring Well Network (LTMWN).
- 2) Final O&M manual and Long-Term Groundwater Monitoring Plan, as appropriate, after the LTMWN is complete.
- 3) Initiate quarterly groundwater monitoring, as soon as possible, after new wells are installed to evaluate the groundwater remedy of monitored natural attenuation.
- 4) Work with MDEQ to resolve vadose zone methane levels and locations.
- 5) Work with MDEQ and the PRPs to place appropriate institutional controls for residential properties adjacent to the landfill.

Recommendations and Follow-up Actions:

- 1) *Complete installation of Long Term Monitoring Well Network (LTMWN).*
- 2) Complete Final O&M manual and Long-Term Groundwater Monitoring Plan, as appropriate, after LTMWN is complete.
- 3) Evaluate monitored natural attenuation component of the remedy.
- 4) Resolve vadose zone methane levels and locations.
- 5) Place appropriate institutional controls for residential properties adjacent to the landfill.

Protectiveness Statement(s):

The remedy is protective of human health and the environment in the short term. There are no current exposure pathways and the remedy appears to be functioning as designed. The construction of landfill cap system has achieved the remedial objectives to minimize the migration of contaminants to groundwater and prevent direct contact with, or ingestion of, contaminants under the landfill cap.

Long-term Protectiveness:

The other remaining component of the cleanup is groundwater monitoring to determine if monitored natural attenuation (MNA) is an effective remedy as compared to a pump and treat system. Groundwater monitoring to determine if MNA is effective will begin in the fall 2004, after the new long-term monitoring wells are installed. The Michigan Department of Environment has raised concerns regarding plume delineation northwest and northeast of the landfill. MDEQ has also raised concerns with regard to landfill gas emissions, although this was addressed in the landfill design that they approved, and it was determined that unsafe levels of explosive gases would not migrate away from the landfill.

**METAMORA LANDFILL SUPERFUND SITE
METAMORA, MICHIGAN
THIRD FIVE-YEAR REVIEW REPORT**

I. INTRODUCTION

The purpose of the five-year review is to determine whether the remedy at a site is protective of human health and the environment. The methods, findings, and conclusions of reviews are documented in Five-Year Review reports. In addition, Five-Year Review reports identify issues found during the review, if any, and identify recommendations to address them.

EPA is preparing this Third Five-Year Review report pursuant to CERCLA §121 and the National Contingency Plan (NCP). CERCLA §121 states:

If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each five years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgement of the President that action is appropriate at such site in accordance with section [104] or [106], the President shall take or require such action. The President shall report to the Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such reviews.

The NCP; 40 CFR §300.430(f)(4)(ii) states:

If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after the initiation of the selected remedial action.

EPA, Region 5, conducted the third five-year review of the remedy implemented at the Metamora Landfill Superfund Site in Metamora, Michigan. This review was conducted by the Remedial Project Manager (RPM) for the entire site from May through September 2004. This report documents the results of the review.

This is the third five-year review for the Metamora Landfill Superfund Site. The second five-year review was completed on September 19, 1999 and the first on August 24, 1993. The triggering action for this statutory review was the first five-year review on August 24, 1993. The five-year review is required due to the fact that hazardous substances, pollutants, or contaminants remain at the site above levels that allow for unlimited use and unrestricted exposure.

II. SITE CHRONOLOGY

Table 1 - Chronology of Site Events

<i>EVENT</i>	<i>DATE</i>
Proposed on NPL	September 08, 1983
Listed on NPL	September 21, 1984
Landfill Operations	1955 - 1980
RI/FS OU1 RI/FS OU2	July 11, 1985 - September 30, 1986 September 30, 1986 - September 28, 1990
Consent Decree Entered	March 17, 1993
OU1 ROD OU2 ROD	September 30, 1986 September 28, 1990
ROD Amendment ROD Amendment	August 28, 1996 September 27, 2001
RD OU1 RD OU2	April 26, 1991 - March 30, 1993 September 26, 1991 - May 7, 2001
RA OU1 RA OU2	February 17, 1998 - May 11, 1993 April 30, 2001 - September 24, 2001
Pre-Final Inspection of Landfill	September 24, 2001
Final Inspection of Landfill	July 16, 2002
PCOR	September 27, 2001
First Five-Year Review	August 24, 1993
Second Five-Year Review Site	September 14, 1999
Third Five- Year Review	September 2004
Next Five-Year Review	Five Years after Signature of Third Five-Year Review

III. BACKGROUND

Physical Characteristics

The Metamora Landfill Site is a closed landfill located approximately 3/4 miles east of the Village of Metamora in Lapeer County, Michigan (See map in attachment I). The Village of Metamora has a population of approximately 507. The area incorporating the landfill occupies about 25 acres of land on a 160-acre parcel.

Land and Resource Use

Residential homes are to the north and east of the Site on 20 acre plots. A gravel mine operates south of the Site. The Site is situated on a local topographic high which is comprised of extensive sand and gravel deposits. The surrounding land use is both residential and agricultural.

History of Contamination

The landfill began operations in 1955 as a privately owned, unregulated open dump. In 1969, the landfill was upgraded to meet existing standards, and licensed to receive general refuse. The landfill received industrial (which included as many as 35,000 drums containing PCBs, and other contaminants) and municipal waste until it closed in 1980.

Initial Response

From 1982 to 1990, many studies were performed at the Site. State lead RA work began in the spring of 1989 and continued until December 1990. This RA consisted of removing the drums from the Site and incinerating them off-site. The basis for the 1984 NPL listing of the Site was primarily from conducting test pits along with results from a magnetic survey that estimated that as many as 35,000 drums were buried at the Site. After December 1990, the RA at the Site was conducted by a group of potentially responsible parties, under EPA oversight, who completed the excavation of the drums and incinerated them off-site.

Basis for Taking Action

In 1981, approximately eight drums were unearthed in the northwest area of the Site during borrow excavations for the nearby solid waste transfer station. The Michigan Department of Natural Resources (MDNR) sampled seven of these drums and identified (but did not quantify) the presence of methylene chloride, methyl chloroform, dicloroethene, and styrene. In 1982, MDNR conducted a magnetometer survey which concluded that as many as 35,000 drums, some containing liquid waste, might be present in five disposal areas around the Site. The survey concluded that area one and four contained about 74% of the total estimated number of buried drums in the landfill.

In the summer of 1985, the MDNR initiated pre-remedial investigation activities at the Site, during which soil borings were taken and thirteen groundwater monitoring wells were installed. Sampling results from the investigation confirmed the existence of inorganic and organic groundwater contamination.

In the fall of 1986, the MDNR initiated the RI/FS at the Site. A Phased FS was completed in August, 1986 which culminated in a ROD for OU1 signed on September 30, 1986. The 1986 ROD called for the excavation and disposal of all waste at an off-site RCRA compliant incinerator.

The RI report was completed in March, 1989. The FS was completed in April 1990. The 1990 ROD was signed on September 20, 1990 and called for a RCRA Subtitle C landfill cap and a groundwater pump and treat system.

IV. REMEDIAL ACTIONS

Remedy Selection

A ROD was signed for the site on September 30, 1986, for OU 1 and a second ROD was signed on September 28, 1990, for OU 2 which consisted of pumping and treating the groundwater and placing a RCRA Subtitle C cap on the landfill. However, on August 28, 1996, an amendment was applied to the 1986 OU1 ROD. Specifically the ROD amendment presented an alternative for soil remediation in Drum Area 1. The OU2 ROD was amended on September 27, 2001, changing the groundwater pump and treat remedy to monitored natural attenuation (MNA).

The selected remedy has the following specific components:

- the excavation and off-site incineration of drums and contaminated soil in Drum Areas 1 and 4;
- the placement of approximately 46,000 cubic yards of contaminated soil in the landfill;
- regrading and seeding of Drum Areas 1 and 4;
- construction of a landfill cap and fence;
- construction of a groundwater well network to monitor natural attenuation in the groundwater;
- placement of institutional controls on the site.

The landfill cap consists of the following components listed in order from bottom to top:

- on-site grading fill layer (varying depths);
- 12-inch bedding soil layer;
- geosynthetic clay liner;
- 40-mil flexible membrane liner;
- 12-inch sand drainage layer;
- 6-inch common fill layer;
- 6-inch topsoil layer;
- vegetative cover.

The purpose of the excavation was to remove drummed material and contaminated soil from these concentrated "hot spots" at the landfill site. Since these areas were estimated to contain 74% of all buried drums in the landfill area, their removal would achieve a significant reduction in point source contamination to the groundwater and surrounding soils. Excavation in Drum Area 4 was completed on December 6, 1989. Excavation and transport of the Soil Staging Area soils to the south side of the landfill was completed in August 1998. Excavation and transport of the Drum Area 1 soils to the south side of the landfill was completed November 1998. Regrading and seeding of Drum Area 1 was performed for OU2 in 1999. Institutional controls on landfill property to limit both land and groundwater use are in place, along with a restriction on the surface water on the property.

The purpose of the clay cap and pump and treat system was to contain groundwater and protect drinking water supplies. The PRP group requested reopening of the 1990 ROD for OU2 to allow for a natural attenuation remedy for the groundwater. As a result, the PRP group performed an analysis of the groundwater for several years since the 1990 ROD and are presented these results in the Conceptual Site Model Report (CSMR) by Conestoga Rovers & Associates, dated June 2001. The results of the study indicated that the groundwater is naturally attenuating and that the groundwater no longer requires containment. As stated above, the ROD was amended on September 27, 2001, changing the groundwater pump and treat remedy to monitored natural attenuation (MNA). The MDEQ concurred with the OU2 ROD for MNA contingent upon an adequate monitoring network being installed.

The amended groundwater remedy includes monitoring the Shallow, Intermediate, and Bedrock Aquifers on a quarterly basis for the first two years which will be used in conjunction with historical monitoring data to estimate long-term degradation rates. An O&M plan for long-term monitoring of the aquifers is required. The data from MNA will be evaluated to determine if it is achieving the goal of remediating the aquifers in a reasonable time frame as compared to more active methods. If MNA is not successful, a contingency plan using more active methods will be implemented to achieve remediation goals.

The effectiveness of the MNA remedy will be assessed within five years. If that assessment determines that MNA alone will not be successful in achieving remediation goals within a reasonable time period, which is generally defined as approximately 30 years in the NCP, implementation of a contingency plan will be required. The contingency plan establishes trigger mechanisms that identify unacceptable performance of MNA and a groundwater quality evaluation procedure to determine the need for implementing contingency remedial measures. Every round of monitoring data will be evaluated using these procedures. If the evaluation of the monitoring data indicates that additional remedial actions are required, the contingency plan outlines potential contingency remedies that may be implemented at the site. Included in the contingency plan are in situ remedial technologies (enhanced bioremediation, chemical oxidation, bio-sparging,) that are appropriate for the contaminants of concern at the site as well as groundwater extraction and treatment. If necessary, U.S. EPA will reconsider the ground water remedy and issue an Amended Record of Decision.

No drinking water wells have been impacted and none are expected to be impacted. The impacted groundwater does not discharge to any surface water bodies; therefore, there are no ecological receptors.

Remedy Implementation

The dates for the RDs for the two operable units are April 26, 1989 - March 30, 1993, for OU1 and September 26, 1991 - May 7, 2001, for OU2.

No difficulties or changes occurred for the design of OU1, although significant difficulties and changes occurred for the design of OU2. The 1993 Pre-Design Hydrogeology Investigation found that pumping even low volumes of groundwater north east of the landfill boundary resulted in the test well running dry. Also, a more thorough investigation of the contaminant plume showed that the plume was not expanding as the RI predicted. As a result of these difficulties, and based on other factors as well, the remedy was changed to MNA after its potential was thoroughly examined in the CSMR.

The dates for the RAs for the two operable units are February 17, 1989 - May 11, 1993, for OU1 and April 30, 2001 - September 24, 2001, for OU2.

The Landfill Cap System has performed as designed since the RA was completed. The landfill gas control system installed in conjunction with the landfill cap was designed to meet the ROD objectives of ensuring that unsafe levels of explosive gases do not migrate away from the landfill and that other hazardous gases are not present in the ambient air at the Site in unsafe levels.

Additions to the monitoring well network should be completed by Fall or Winter 2004. The implementation and evaluation of MNA will begin as soon as the new monitoring wells are installed.

A Consent Decree was entered on March 17, 1993, with what now constitutes the Metamora Landfill Settling PRP Group (MLSPG). The MLSPG will be implementing the O&M for the landfill and will be conducting the groundwater monitoring for the MNA remedy.

Systems Operations/ Operations and Maintenance

The Site remedy has two major components covered by the Operation and Maintenance (O&M) Plan: landfill cap system and monitored natural attenuation for groundwater. The purpose of the landfill cap system is to prevent contact with, and minimize surface water infiltration into, the waste. The landfill cap system has no operational requirements, but requires regular inspections and maintenance to ensure that it serves its intended purpose. MNA does not have operational requirements, but regular monitoring is required to verify that natural attenuation continues to reduce Site-related constituents in groundwater.

There are no problems to date with regard to implementation of system operations/O&M. However, MDEQ has raised concerns regarding the definition of the downgradient plume and methane levels.

System operations/O&M activities to date.

Since the landfill cap system completion in September 2001, quarterly inspections of the landfill cap system and ancillary structures (for example, access roads, security fence) have been conducted, with maintenance performed, as necessary. The quarterly inspections included landfill gas probe monitoring. The landfill system vegetative cover was mowed in 2004. Vertical aquifer sampling and monitoring well installation continues to be conducted to complete the long-term groundwater monitoring network.

Table 2 - Annual Landfill System Operations/O&M Costs

Dates		Total Cost
From	To	
Dec 2001	Dec 2002	\$30,000
Dec 2002	Dec 2003	\$25,000

V. PROGRESS SINCE THE LAST FIVE-YEAR REVIEW

Table 3: Actions Taken Since the Last Five-Year Review

Recommendations From Previous Review	Party Responsible	Action Taken
Construction of Landfill Cap	PRP	Construction Complete
Implement MNA & Continue Groundwater Monitoring	PRP	On-going Groundwater Evaluation & Monitoring

The second five-year review recommended that the clay cap be constructed to minimize infiltration through the landfill contents and the groundwater treatment system be constructed to contain the groundwater plume or that the 1990 ROD be amended to MNA for the groundwater. Since the five-year review, the cap has been constructed and MNA was the amended groundwater remedy.

VI. FIVE-YEAR REVIEW PROCESS

Administrative Components

On May 11, 2004, members of the MDEQ were notified of the initiation of the five-year review. The Metamora Five-Year Review team was led by Tom Williams of EPA, RPM for the Metamora Site, and Keith Krawczyk of the MDEQ. The MLSPG have also expressed interest in being part of the Five-Year Review Process.

From May 11, 2004 to August 6, 2004, the RPM established the review schedule. Its components included:

- Community Notification;
- Document Review;
- Data Review;
- Site Inspection;
- Five-Year Review Report Development and Review

Community Involvement

Activities to involve the community in the five-year review process were initiated in May 2004 with a notification to the Community Involvement Coordinator (CIC) for the Metamora Superfund Site.

A notice was published on August 18, 2004 in the local newspaper, County Press, that a five-year review was being conducted. Since the news paper ad, no member of the community or any other individual has voiced any interest in conducting an interview related to the five-year review.

Document Review

This five-year review consisted of a review of relevant site documents including, but not limited to the Record of Decision, September 30, 1986, Record of Decision, September 28, 1990, Record of Decision Amendment, August 28, 1996, Second Five- Year Review, September 14, 1999, Record of Decision Amendment, September 27, 2001, and the Conceptual Site Model.

Data Review

No data review was performed for groundwater because the Long Term Monitoring Well Network installation is near completion (although additional wells may be recommended) and the evaluation of MNA will start after the new monitoring wells are installed.

Site Inspections

An inspection of the landfill was performed as part of this five- year review on July 14, 2004 by Mr. Keith Krawczyk of the MDEQ and Mr. Tom Williams, the Remedial Project Manager, for the EPA. No major problems were observed with regard to the maintenance of the landfill. Dead trees were observed outside of the landfill boundary although no new dying vegetation was observed and additional growth from tall bushes was observed. Gas probe #6 was not visible near the wash pond of John R Sand and Gravel.

Mr. Krawczyk has expressed concern in the past and at the Site inspection with regard to methane levels in some of the perimeter gas probes and gas migration off-site. Mr. Krawczyk was asked if a ambient air survey was necessary on or off the landfill with the methane gas meter at the inspection and he said it was not. Mr. Williams agreed.

On May 9, 2003, the MLSPG submitted a Landfill Gas Delineation Work Plan. The work has not been initiated because the land owner (Mr. Folkman) refuses access to perform the work. The next step will be to secure access to Mr. Folkman's home along with other homes to test for methane levels on their properties, as appropriate.

Interviews

Interviews with individuals beyond the five-year review project team were not conducted. As mentioned previous, since the news paper ad, no member of the community or any other individual has voiced any interest in conducting an interview related to the five-year review.

VII. TECHNICAL ASSESSMENT

Question A: Is the remedy functioning as intended by the decision documents?

The review of documents, applicable or relevant and appropriate requirements, risk assumptions, and the results of the site inspection indicates that the remedy is functioning as intended by the RODs, and ROD amendments. The 1990 ROD required institutional controls implementing deed and access restrictions to prevent development of the Site, and to assure the integrity of the remedial action. Site access and use is restricted with a security perimeter fence, along with a restriction on the surface water

and groundwater on the property. These controls and restrictions remain and were in place with the Russell Parrish estate. MDEQ has raised concerns regarding delineation of the methane gas plume. U.S. EPA will work with MDEQ and adjacent land owners to address this concern.

The other remaining component of this remedy is the groundwater. Monitoring to evaluate the effectiveness of MNA will begin this fall. The effectiveness of the MNA remedy will be assessed within five years. If this assessment determines that MNA alone will not be successful in achieving remediation goals within a reasonable time period, which is generally defined as approximately 30 years in the NCP, a contingency plan will be implemented. MDEQ has expressed concerns regarding plume delineation to the northwest and northeast of the site. As a result the PRP's are installing additional monitoring wells to better delineate the plume. After the results of this additional data have been evaluated, the need for even more wells to further define the plume will be determined.

Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of the remedy selection still valid?

There have been no changes in the physical conditions of the Metamora Landfill Site that would affect the protectiveness of the remedy.

Changes in Standards and To be Considers

As the remedial work has been completed, most ARARs for soil, the landfill cap cited in the RODs and first ROD amendment have been met. ARARs that still must be met at this time and that have been evaluated include: The Safe Drinking Water Act (SDWA)(40 CFR 141.11-141.16) and the state of Michigan's generic residential criteria under, "Part 201, Environmental Remediation, of the Natural Resources and Environmental Protection Act, 1994 PA 452, as amended," whichever is more restrictive. There have been no changes in these ARARs and no new standards or to be considers (TBCs) affecting the protectiveness of the remedy.

Changes in Exposure Pathways, Toxicity, and Other Contaminant Characteristics

The exposure assumptions used to develop the Human Health Risk Assessment included exposure to contaminated groundwater from possible future ingestion pathway, and exposure to leachate contaminated soils from a possible future dermal contact and ingestion pathway.

There have been no changes in the toxicity factors for the contaminants of concern that were used in the baseline risk assessment. These assumptions are considered to be conservative and reasonable in evaluating risk and developing risk-based cleanup levels. No change to these assumptions, or the cleanup levels developed from them is warranted. There has been no change to the standardized risk assessment methodology that could affect the protectiveness of the remedy. The remedy is progressing as expected and it is expected that all groundwater cleanup levels will be met within 30 years or sooner, as specified in the second ROD amendment.

Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

No other events have affected the protectiveness of the remedy and there is no other information that calls into question the short-term protectiveness of the remedy. Long-term protectiveness issues associated with the MNA and methane plume will be evaluated after the new monitoring wells are installed and off-site access can be secured.

Technical Assessment Summary

According to the data reviewed and the site inspection, the remedy is functioning as designed by the RODs. There have been no changes in the physical conditions of the Site that would affect the protectiveness of the remedy. ARARs for soil contamination and the landfill cap cited in the RODs and the amendments have been met. There have been no changes in the toxicity factors for the contaminants of concern that were used in the baseline risk assessment, and there have been no changes to the standardized risk assessment methodology that could affect the protectiveness of the remedy.

VIII. ISSUES

Table 4 - Issues

Issue	Currently Affects Protectiveness (Y/N)	Affects Future Protectiveness (Y/N)
Complete Long Term Monitoring Well Network	N	N
Complete Final O&M manual after LTMWN is complete	N	N
Work with MDEQ to resolve vadose zone methane levels and locations	N	Y
Work with MDEQ and the PRPs with regard to appropriate institutional controls for residential properties adjacent to the landfill.	N	Y
Begin evaluating MNA	N	Y

IX. RECOMMENDATIONS AND FOLLOW-UP ACTIONS

Table 5 - Recommendations and Follow-Up Actions

Issue	Recommendations/ Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness? (Y/N)	
					Current	Future
Complete LTMWN	Work with all parties involved to see this completed ASAP	EPA/MDEQ/ PRP	EPA/ MDEQ	Fall 2004	N	N
Complete Final O&M manual after LTMWN is complete	None	PRP	EPA/ MDEQ	December 2004	N	N
Resolve methane vadose zone issue	Work with all parties involved to see this completed ASAP	EPA/MDEQ/ PRP	EPA/ MDEQ	Spring 2005	N	Y
Institutional Controls on Residential Property	Work with all parties involved to see this completed in a timely manner	PRP	EPA/ MDEQ	Summer 2005	N	Y
Conduct groundwater monitoring and evaluate MNA	Work with all parties involved to see this completed in a timely manner	EPA/MDEQ/ PRP	EPA/ MDEQ	December 2006	N	Y

X. PROTECTIVENESS STATEMENT

Completion of the current five-year review confirms that the Metamora Landfill Superfund Site is protective of human health and the environment, and exposure pathways that could result in unacceptable risks are being controlled. The Site landfill cap is functional, operational and effective. Restrictions for Site access and use of contaminated groundwater associated with the Site remain in place.

The other remaining component of this remedy is the groundwater. Monitoring to evaluate the effectiveness of MNA will begin by Fall 2004. The effectiveness of the MNA remedy will be assessed within five years. If this assessment determines that MNA alone will not be successful in achieving remediation goals within a reasonable time period, which is generally defined as approximately 30 years in

the NCP, U.S. EPA will implement the contingency plan. Long-Term protectiveness for groundwater media and methane gas will be assessed in the next Five Year- Review.

XI. NEXT REVIEW

The next five-year review for the Metamora Site is required by September 2009, five years from the date of this review.

ATTACHMENTS

Figure 1

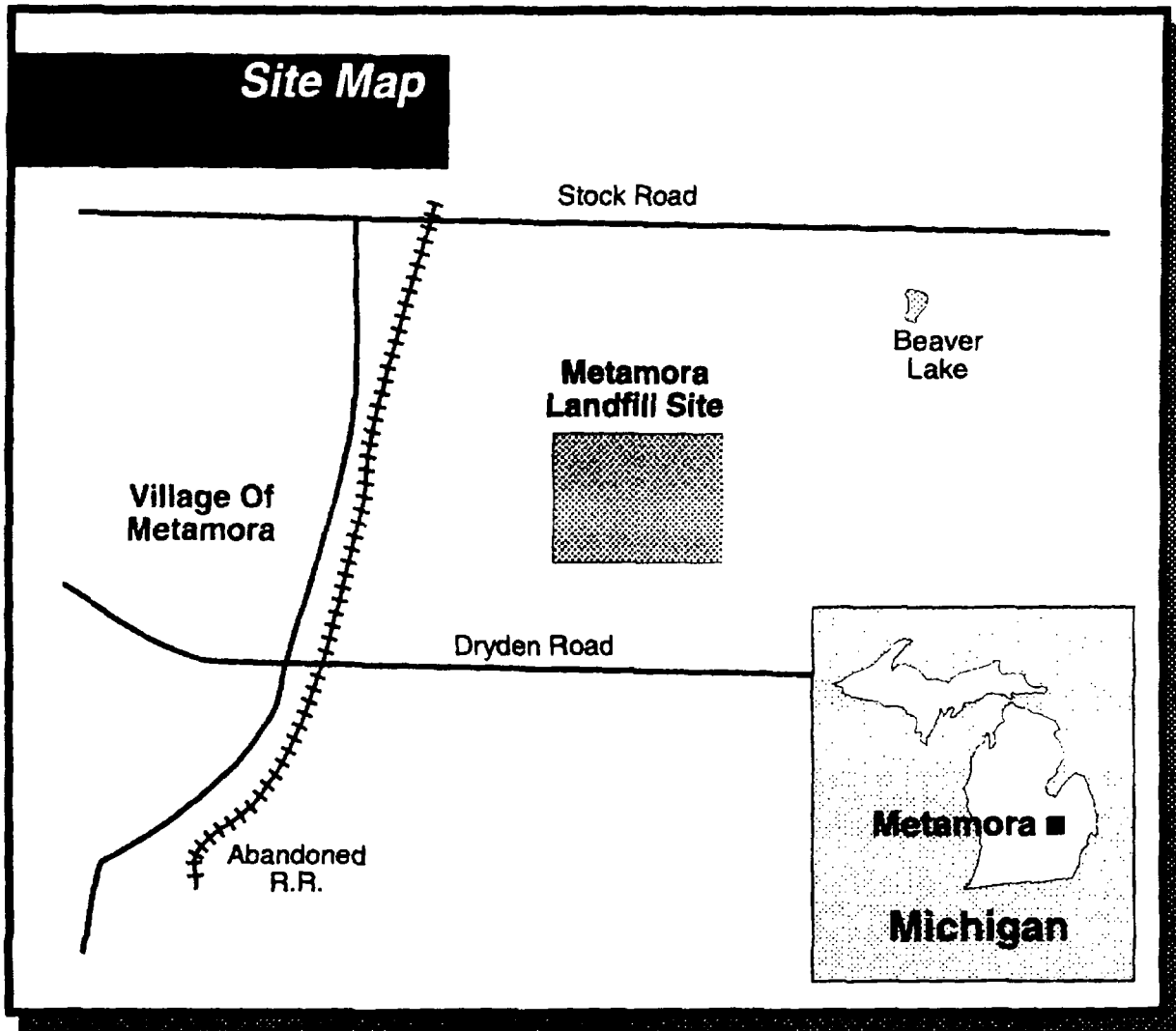
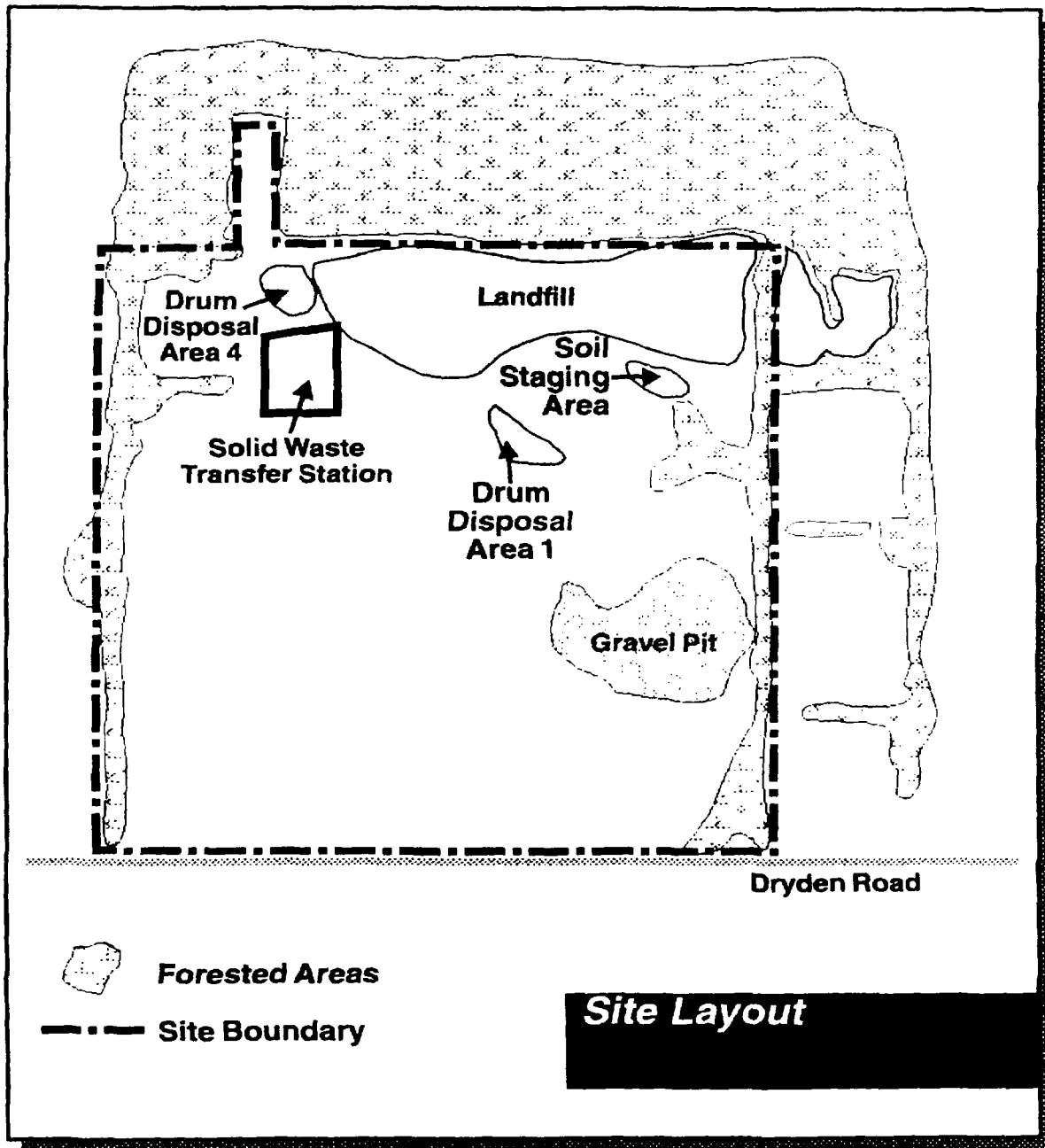


Figure 2



ATTACHMENT 3
List of Documents Reviewed

Metamora Landfill Superfund Site Record of Decision, September 30, 1986

Metamora Landfill Superfund Site Record of Decision, September 28, 1990

Metamora Landfill Superfund Site Record of Decision Amendment, August 28, 1996

Metamora Landfill Superfund Site Five- Year Review, September 14, 1999

Metamora Landfill Superfund Site Record of Decision Amendment, September 27, 2001

ATTACHMENT 4

ARARs

Safe Drinking Water Act

Michigan's, Part 201, Environmental Remediation, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended

Michigan Administrative Rule R299.9619 (as regulated by Act 451, Part 111)

Resource Conservation and Recovery Act (RCRA) Subtitle C